PLANNING ASSISTANCE TO STATES AGREEMENT

BETWEEN

THE DEPARTMENT OF THE ARMY

AND

STATE OF HAWAII, DEPARTMENT OF HEALTH

FOR THE LAHAINA, MAUI, GROUNDWATER TRACER SECTION 22 STUDY

THIS AGREEMENT is entered into this 17th day, of November, 2010 by and between the Department of the Army (hereinafter the "Government"), represented by the District Engineer executing this Agreement, and the State of Hawaii, Department of Health (hereinafter the "Sponsor").

WITNESSETH, that

WHEREAS, Section 22 of the Water Resources Development Act (WRDA) of 1974 (Public Law 93-251), as amended, authorizes the Secretary of the Army, acting through the Chief of Engineers, to cooperate with any State, as therein defined, in the preparation of comprehensive plans for the development, utilization and conservation of water and related resources of drainage basins, watersheds, or ecosystems located within the boundaries of such State and to submit to Congress reports and recommendation with respect to appropriate Federal participation in carrying out such plans;

WHEREAS, Section 319 of the Water Resources Development Act of 1990 (Public Law 101-640) authorizes the Secretary of the Army to collect from non-Federal entities fees for the purpose of recovering 50 percent of the cost of the program established by Section 22 of the 1974 WRDA;

WHEREAS, the Sponsor may provide up to 100 percent of its required contribution of Study Costs through the provision of services, materials, supplies or other in-kind-services necessary to prepare the plan.

WHEREAS, the Sponsor has reviewed the State's comprehensive water plans and identified the need for planning assistance as described in the Scope of Studies incorporated into this agreement; and

WHEREAS, the Sponsor has the authority and capability to furnish the cooperation hereinafter set forth and is willing to participate in the study cost-sharing and financing in accordance with the terms of this Agreement;

NOW THEREFORE, the parties agree as follows:

ARTICLE I - DEFINITIONS

For the purposes of this Agreement:

A. The term "Study Costs" shall mean all disbursements by the Government pursuant to this Agreement, from Federal appropriations or from funds made available to the Government by the Sponsor and all negotiated costs of work performed by the Sponsor pursuant to this Agreement. Study Costs shall include, but not be limited to: labor charges; direct costs; overhead expenses; supervision and administration costs; the costs of participation in Study Management and Coordination in accordance with Article IV of this Agreement; the costs of contracts with third parties, including termination or suspension charges; and any termination or suspension costs (ordinarily defined as those costs necessary to terminate ongoing contracts or obligations and to properly safeguard the work already accomplished) associated with this Agreement.

B. The term "estimated Study Costs" shall mean the estimated cost of performing the Study as of the effective date of this Agreement, as specified in Article III.A. of this Agreement.

C. The term "study period" shall mean the time period for conducting the Study, commencing with the release to the U.S. Army Corps of Engineers, Honolulu District of initial Federal funds following the execution of this Agreement and ending when the Honolulu District provides the planning report to the Sponsor.

D. The term "SOW" shall mean the Scope of Work, which is attached to this Agreement and which shall not be considered binding on either party and is subject to change by the Government, in consultation with the Sponsor.

E. The term "fiscal year" shall mean one fiscal year of the Government. The Government fiscal year begins on October 1 and ends on September 30.

F. The term "negotiated costs" shall mean the costs of in-kind services to be provided by the Sponsor in accordance with the SOW.

ARTICLE II - OBLIGATIONS OF PARTIES

A. Subject to the availability of funds appropriated by the Congress of the United States (Congress), the Government, using funds and in-kind services provided by the Sponsor and Congressionally appropriated funds, shall expeditiously prosecute and complete the Study, in accordance with the provisions of this Agreement and Federal laws, regulations, and policies.

B. In accordance with this Article and Article III. of this Agreement, the Sponsor shall contribute cash or in-kind services equal to fifty (50) percent of Study Costs. If agreeable to all parties, in-kind services may comprise 100 percent of the Sponsor's contributions. The in-kind services to be provided by the Sponsor, the estimated negotiated costs for those services, and estimated schedule under which those services are to be prepared are specified in the Scope of Work. Negotiated costs shall be subject to an audit by the Government to determine reasonableness, allocability and allowability.

C. The Sponsor understands that the schedule of work may require the Sponsor to provide cash or in-kind services at a rate that may result in the Sponsor temporarily diverging from the obligations concerning cash and in-kind services specified in paragraph B. of this Article. Such temporary divergences shall be identified in the quarterly reports provided for in Article III.A. of this Agreement and shall not alter the obligations concerning payment specified in paragraph B. of this Article or the obligations concerning payment specified in Article III of this Agreement.

D. If, upon the award of any contract or the performance of any in-house work for the Study by the Government, cumulative financial obligations of the Government and the Sponsor would exceed $345,000, the Government and the Sponsor agree to defer award of that and all subsequent contracts, and performance of that and all subsequent in-house work, for the Study until the Government and the Sponsor agree to proceed. Should the Government and the Sponsor require time to arrive at a decision, the Agreement will be suspended in accordance with Article X., for a period of not to exceed six months. In the event the Government and the Sponsor have not reached an agreement to proceed by the end of their 6-month period, the Agreement may be subject to termination in accordance with Article X.

E. No Federal funds may be expended or obligated by the Sponsor to meet the Sponsor's share of Study costs under this Agreement unless the expenditure or obligation of such funds is expressly authorized by statute for such purposes and the Federal granting agency verifies in writing that the expenditure of such funds is expressly authorized by statute.

F. The award and management of any contract with a third party in furtherance of this Agreement which obligates Federal appropriations shall be exclusively within the control of the Government. The award and management of any contract by the Sponsor with a third party in furtherance of the Agreement which obligates funds of the Sponsor and does not obligate Federal appropriations shall be exclusively within the control of the Sponsor, but shall be subject to applicable Federal laws and regulations.

G. Notwithstanding any provision of this Agreement, this Agreement and the Government's obligations hereunder shall not be effective and will not commence until Federal funds have been appropriated and allocated to the District Engineer, U.S. Army Corps of Engineers Honolulu District for the implementation of this study. In the event that Federal funds are allocated to the District Engineer for this study after the date that the parties hereto execute this Agreement, the effective date of this Agreement shall be the date that funding approval is provided to the District Engineer.

H. In the event that any one or more of the provisions of this Agreement is found to be invalid, illegal, or unenforceable, by a court of competent jurisdiction, the validity of the remaining provisions shall not in any way be affected or impaired and shall continue in effect until the Agreement is completed.

ARTICLE III - METHOD OF PAYMENT

A. The Government shall maintain current records of contributions provided by the parties, current projections of Study Costs, current projections of each party's share of Study Costs. At least quarterly, the Government shall provide the Sponsor a report setting forth this

information. As of the effective date of this Agreement, estimated Study Costs are $300,000 and the Sponsor's share of estimated Study Costs is $150,000. The dollar amounts set forth in this Article are based upon the Government's best estimates, which reflect the scope of the study described in the SOW, projected costs, price-level changes, and anticipated inflation. Such cost estimates are subject to adjustment by the Government and are not to be construed as the total financial responsibilities of the Government and the Sponsor.

B. The Sponsor shall provide its cash contribution required under Article II.B. of this Agreement in accordance with the following provisions:

1. No later than 30 days prior to the scheduled date for the Government's issuance of the solicitation for the first contract for the Study or for the Government's anticipated first significant in-house expenditure for the Study, the Government shall notify the Sponsor in writing of the funds the Government determines to be required from the Sponsor to meet its share of Study Costs. No later than 15 days thereafter, the Sponsor shall provide the Government the full amount of the required funds by delivering a check payable to "FAO, USAED, Honolulu District" to the District Engineer or an Electronic Funds Transfer in accordance with procedures established by the Government.

2. The Government shall draw from the funds provided by the Sponsor such sums as the Government deems necessary to cover the Sponsor's share of contractual and in-house financial obligations attributable to the Study as they are incurred.

3. In the event the Government determines that the Sponsor must provide additional funds to meet its share of Study Costs, the Government shall so notify the Sponsor in writing. No later than 60 days after receipt of such notice, the Sponsor shall provide the Government with a check or an Electronic Funds Transfer for the full amount of the additional required funds.

C. Within 90 days after the conclusion of the Study Period or termination of this Agreement, the Government shall conduct a final accounting of Study Costs, including disbursements by the Government of Federal funds, cash contributions by the Sponsor and credits for the negotiated costs of the Sponsor's in-kind services, and shall furnish the Sponsor with the results of this accounting. Within 30 days thereafter, the Government, subject to the availability of funds, shall reimburse the Sponsor for the excess, if any, of cash contributions and credits given over its required share of Study Costs, or the Sponsor shall provide the Government any cash contributions required for the Sponsor to meet its required share of Study Costs.

ARTICLE IV - STUDY MANAGEMENT AND COORDINATION

To provide for consistent and effective communication, the Government's Project Manager for the Study and the Sponsor's designated representative shall communicate regularly until the end of the Study Period.

ARTICLE V - DISPUTES

As a condition precedent to a party bringing any suit for breach of this Agreement, that party must first notify the other party in writing of the nature of the purported breach and seek in good faith to resolve the dispute through negotiation. If the parties cannot resolve the

dispute through negotiation, they may agree to a mutually acceptable method of non-binding alternative dispute resolution with a qualified third party acceptable to both parties. The parties shall each pay 50 percent of any costs for the services provided by such a third party as such costs are incurred. Such costs shall not be included in Study Costs. The existence of a dispute shall not excuse the parties from performance pursuant to this Agreement.

ARTICLE VI - MAINTENANCE OF RECORDS AND AUDIT

A. Within 60 days of the effective date of this Agreement, the Government and the Sponsor shall develop procedures for keeping books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to this Agreement. These procedures shall incorporate, and apply as appropriate, the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 C.F.R. Section 33.20. The Government and the Sponsor shall maintain such books, records, documents, and other evidence in accordance with these procedures and for a minimum of three years after the period of design and resolution of all relevant claims arising therefrom. To the extent permitted under applicable Federal laws and regulations, the Government and the Sponsor shall each allow the other to inspect such books, documents, records, and other evidence.

B. In accordance with 31 U.S.C. Section 7503, the Government may conduct audits in addition to any audit that the Sponsor is required to conduct under the Single Audit Act. Any such Government audits shall be conducted in accordance with Government Auditing Standards and the cost principles in OMB Circular No. A-87 and other applicable cost principles and regulations. The costs of Government audits shall be included in total Study Costs and cost shared in accordance with the provisions of this Agreement.

ARTICLE VII - RELATIONSHIP OF PARTIES

The Government and the Sponsor act in independent capacities in the performance of their respective rights and obligations under this Agreement, and neither is to be considered the officer, agent, or employee of the other.

ARTICLE VIII - OFFICIALS NOT TO BENEFIT

No member of or delegate to the Congress, nor any resident commissioner, shall be admitted to any share or part of this Agreement, or to any benefit that may arise therefrom.

ARTICLE IX - FEDERAL AND STATE LAWS

In the exercise of the Sponsor's rights and obligations under this Agreement, the Sponsor agrees to comply with all applicable Federal and State laws and regulations, including Section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 88-352) and Department of Defense Directive 5500.11 issued pursuant thereto and published in 32 C.F.R. Part 195, as well as Army Regulations 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army."

ARTICLE X - TERMINATION OR SUSPENSION

A. This Agreement shall terminate at the conclusion of the Study Period, and neither the Government nor the Sponsor shall have any further obligations hereunder, except as provided in Article III.C.; provided, that prior to such time and upon 30 days written notice, either party may terminate or suspend this Agreement. In addition, the Government shall terminate this Agreement immediately upon the failure of the parties to extend the study under Article II.D. of the Agreement, or upon failure of the Sponsor to fulfill its obligation under Article III. of this Agreement. In the event that either party elects to terminate this Agreement, both parties shall conclude their activities relating to the Study and proceed to a final accounting in accordance with Article III.C. of this Agreement. Upon termination of this Agreement, all data and information generated as part of the Study shall be made available to both parties.

B. Any termination of this Agreement shall not relieve the parties of liability for any obligations previously incurred, including the costs of closing out or transferring any existing contracts.

ARTICLE XI – LIMITATION ON GOVERNMENT EXPENDITURE

In accordance with Section 22 of WRDA 1974, as amended, Government financial participation in the cooperative preparation of comprehensive plans for development, utilization, and conservation of water and related resources pursuant to said authority shall be limited to the expenditure of not more than $2,000,000 in any one year in any one State.

IN WITNESS WHEREOF, the parties hereto shall have executed this Agreement upon the date it is signed by both the parties. It shall become effective pursuant to the provisions of Article II. G. of the Agreement.

State of Hawaii, Department of Health

BY: _____ DATE: NOV - 5 2010
Chiyome Leimomi Fukino, M.D.
Director

DEPARTMENT OF THE ARMY

BY: _____ DATE: 17 NOV 2010
Douglas B. Guttormsen, P.E.
Lieutenant Colonel, Corps of Engineers
District Engineer
Honolulu District

Attachment - Scope of Work, Budget Estimate

CERTIFICATE OF AUTHORITY

I, Mark Bennett, do hereby certify that I am the principal legal officer for the State of Hawaii, Department of Health and that it is a legally constituted public body with full authority and legal capability to perform the terms of the Agreement between the Department of the Army and the State of Hawaii, Department of Health in connection with the Lahaina, Maui Groundwater Tracer Section 22 Study, and that the person who has executed this Agreement on behalf of the State of Hawaii, Department of Health has acted within his/her statutory authority.

IN WITNESS WHEREOF, I have made and executed this certification this 17th day of November, 2010.

Signature: _____

Typed Name: **Mr. Mark J. Bennett**

Title in Full: **State of Hawaii, Attorney General**

NON-FEDERAL SPONSOR'S
SELF-CERTIFICATION OF FINANCIAL CAPABILITY
FOR AGREEMENTS

I, Sharon S. Abe, do hereby certify that I am the Chief Financial officer of the State of Hawaii, Department of Health ("Non-Federal Sponsor"); that I am aware of the financial obligations of the Non-Federal Sponsor for the Lahaina, Maui Groundwater Tracer Section 22 Study, and that the Non-Federal Sponsor has the financial capability to satisfy the Non-Federal Sponsor's obligations under the Planning Assistance to the States Agreement between the Department of the Army and State of Hawaii, Department of Health for the Lahaina, Maui, Groundwater Tracer Section 22 Study.

IN WITNESS WHEREOF, I have made and executed this certification this 4th day of November, 2010.

BY: Sharon S. Abe

TYPED NAME: **Sharon S. Abe**

TITLE: **Chief, Administrative Services Office, State of Hawaii, Department of Health**

DATE: 11/4/10

ATTACHMENT 1 - LAHAINA GROUNDWATER TRACER SECTION 22 STUDY SCOPE OF WORK

1.0 Location:

The study will cover the area southwest of the Lahaina Wastewater Reclamation Facility in Lahaina, the Island of Maui, State of Hawaii out past the submerged groundwater seeps off the shore of Kahekili Beach Park as depicted in Figures 1 and 2.

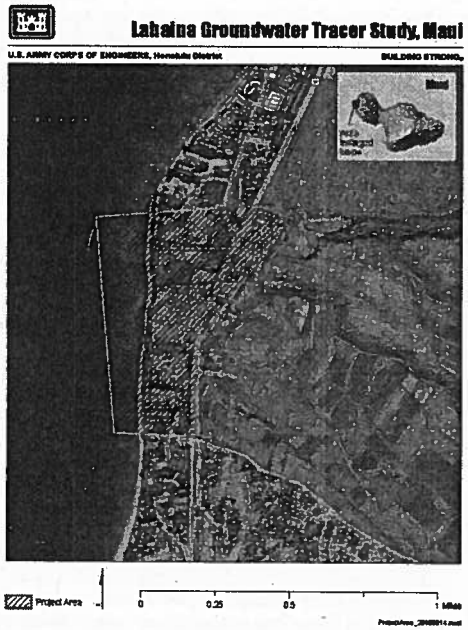

Figure 1: Lahaina Groundwater Tracer Section 22 Study Location Map

Figure 2: Location Map of Submerged Groundwater Seeps, Kahekili Beach Park

2.0 Purpose:

The Lahaina Wastewater Reclamation Facility (LWRF or facility) disposes of wastewater effluent into injection wells located approximately 1900 feet from the shoreline between Black Rock and Honokowai Pt, Lahaina, Hawaii. The main purpose of this Scope of Work is to conduct a tracer study to confirm the locations of the emerging discharge of injected effluent into the coastal marine waters and determine a travel time from the facility's injection wells to coastal waters.

3.0 Background:

Maui County owns and operates the facility located at 3300 Honoapiilani Highway, Honokowai, Lahaina, Maui in Hawaii. The facility treats domestic wastewater to secondary treatment levels with advanced sand filtration and disposes of most of the treated wastewater into four (4) gravity-fed Class V Underground Injection Control (UIC) injection wells. The four injection wells have a total depth of 165 to 255 feet. Total injection volume into the UIC wells averages about 3 to 5 million gallons per day (MGD). The geology into which treated effluent is injected consists of highly permeable basalt lava flows. Injection of treated wastewater effluent at the wells forms a buoyant plume within the aquifer, extending from the wells to the coast.

The County has a federal UIC permit for the injection wells, which expired on June 12, 2005. The conditions of the expired permit continue in force until the effective date of a new permit. The United States Environmental Protection Agency (EPA) is processing a permit renewal application (available at http://www.epa.gov/region9/water/groundwater/uic-pdfs/LahainaPermitApp.pdf for background on geology, injection well operation, facility map, etc.) and addressing other regulatory requirements related to the facility's operation.

EPA is investigating the possible discharge of pollutants from the facility injection wells to the coastal waters of the Pacific Ocean along the Kaanapali coast of Maui. This study will support the initial stages of this effort. In 2007 and 2008, the University of Hawaii[1] (UH) and the U.S. Geological Survey[2] (USGS) conducted inherent tracer studies, which found substantial evidence that injected effluent from the facility is emerging from submarine springs into the coastal water around Kahekili Beach Park along the Kaanapali coast-line. In order to better understand wastewater plume movement, EPA has determined that a tracer study must be conducted to determine hydrologic characteristics and the time of travel from injection to the emergence of the effluent in the coastal water. This tracer study is intended to provide important data about the hydrological connection between the effluent discharge and the coastal waters. Therefore, the work must deliver accurate, unbiased, and defensible information.

EPA has funded the State of Hawaii Department of Health (DOH) to implement this introduced tracer study. DOH has requested assistance from U.S. Army Corps of Engineers, Honolulu District (POH) through the Planning Assistance Program to complete this study. EPA has confirmed that DOH may use EPA funds as work-in kind match for this study (see Enclosure 1). In accordance with Section 2007 of the Water Resources Development Act (WRDA) 2007 and its implementing guidance, POH may accept other federal dollars as non-federal match with the written approval of the other federal agency to the non-federal sponsor.

4.0 EPA Technical Direction for DOH Work In-Kind:

DOH intends to issue a contract to accomplish the activities designated as "work in-kind" for this study using EPA provided funds (see Section 7.0 Phase II). Specific to the use of EPA funds, DOH Work Assignment Manager (WAM) is authorized to provide technical direction which clarifies the SOW. **The DOH WAM will consult with the EPA contacts prior to issuing technical direction.** Before accepting any action under technical direction, the DOH Contractor shall ensure that the technical direction falls within the scope of work. Technical direction will be issued in writing or confirmed in writing, by DOH WAM, within five (5) calendar days after verbal issuance. DOH WAM will forward a copy of the technical direction letter to the EPA contact. Technical direction must be within the scope of the contract. Technical direction includes (1) direction to the DOH Contractor which assists the Contractor in accomplishing the SOW and (2) comments on and approval of proposals, reports and other deliverables. **The DOH Contracting Officer is the only person authorized to make changes to this contract. Any changes must be approved by the Contracting Officer in writing, as an amendment and/or a modification to the contract.**

1 Dailer, M.L., Knox, R.S., Smith, J.E., Napier, M., Smith, C. M., (2010) Using delta-15N values in algal tissue to map locations and potential sources of anthropogenic nutrient inputs on the island of Maui, Hawai'i, USA. Mar. Pollut. Bull. doi:10.1016/j.marpolbul.2009.12.021

2 Hunt, C.D., Jr., and Rosa, S.N., 2009, A multitracer approach to detecting wastewater plumes from municipal injection wells in nearshore marine waters at Kihei and Lahaina, Maui, Hawaii: U.S. Geological Survey Scientific Investigations Report 2009-5253, 166 p.

5.0 Technical Direction for POH Funded Actions:

Because the technical skills needed to complete the POH funded actions are research in nature and would benefit from the neutrality of a research institution, the intent is for POH to issue a request for research proposal (RFP) through the Hawaii and Pacific Islands Cooperative Ecological Services Unit (CESU) Agreement. In the event that no proposals are received or proposals are inadequate, POH will evaluate other mechanisms to obtain adequate technical research skills to complete the study.

EPA and DOH will act as primary subject matter experts – providing the technical direction for the SOW, assisting in the review of the proposals, and conducting quality control review on the interim and final products.

6.0 Study Schedule:

Following are the tasks to be completed for this study. Dates are based on the calendar days after the Cost Share Agreement is executed and funds and/or work in-kind documentation is received.

TASK	RESPONSIBLE ENTITY	BUSINESS DAYS AFTER CSA EXECUTION
Project Management Plan	POH	15 days
Final SOW for Phase I and Phase II Tasks	POH and DOH	30 days
Issuance of CESU RFP	POH	40 days
Receipt of CESU Proposals	POH	100 days
Issuance of CESU NTP	POH	115 days
Issuance of DOH Contractor NTP	DOH	115 days
Draft Phase I CESU Research Findings for Review (Tasks 1-6)	POH	170 days
Draft Phase II DOH Contractor Findings for Review (Tasks 7-9)	DOH	310 days
Draft Tracer Study Report for Review	POH	345 days
Final Tracer Study Report	POH	365 days
Financial Closeout	POH	380 days

7.0 Scope of Work – Introduction:

This study will entail the release of known quantities of fluorescent dyes into the subsurface environment via injection wells at LWRF and recovery of the dyes at near shore marine water locations. Multiple releases of fluorescent dye, sometimes duplicating previous releases, may be necessary to properly complete the project. The work includes background documents review,

field survey, tracer selection, design planning, work plan writing, background fluorescence study, tracer study implementation, breakthrough curve (BTC) analyses, interpretation, and report writing. This Scope of Work presents the steps for the tracer test in a phased approach:

Phase I (POH Funded Action)

Review of literature, research publications and prior studies. Design of the study will require a desk top review of the past tracer study report conducted in 1993, (titled Effluent Fate Study Lahaina Wastewater Reclamation Facility, Maui, Hawaii, dated February 1994), University of Hawaii and US Geological Services (USGS) published studies as cited in the background section above, and other useful background sources.

Field Reconnaissance. The initial design will consist of planning the dye-release activities, determining sampling sites, and establishing a sampling strategy. Field work must be conducted to identify sampling locations for groundwater seeps, to tour the facility, and to record information useful in the design of the tracer study.

Tracer Study Design. This step includes selecting the type and amount of tracer, defining relevant tracer properties to meet the study goals, evaluating interference from the chemistry of the effluent characteristics and determining the best dye release procedures. Modeling tools can be used to determine dye concentrations, predict tracer-breakthrough characteristics, and the time intervals needed for effective sampling of the passage of the tracer. This design work will also delineate the study area and propose an achievable monitoring strategy for a successful test.

Tracer Study Work plan. A written work plan will explicitly describe how the test will be conducted (e.g., how much of a specific tracer(s) will be used, duration of tracer addition, injection location, sampling locations, etc.). A monitoring strategy, sampling and analysis plan including test methods and duration and frequency of testing, Quality Assurance/Quality Control procedures, and a proposed schedule will also be part of this written plan.

Background Assessment. The Background Monitoring task involves the monitoring of the specified submarine seeps and other locations in the study area for background concentrations of fluorescence (or other chosen tracer type) from man-made substances and natural interference.

Phase II (DOH Funded Action – Provided as Work In-Kind)

Tracer Study Implementation. This is actual deployment of the EPA-approved tracer study work plan, including the required documentation (field notes, etc.). Monitoring, sampling and analysis will be implemented as described in the approved work plan, but minor changes based on unanticipated field conditions may be necessary. Timing from detecting the first positive confirmation of tracer through the last detection will be critical to the usefulness of the results.

Test Interpretation. Test interpretation will be quantitative to deliver useful and reliable information. A quantitative test does not rely solely on the detection of the introduced fluorescent substance at the sampling locations but also on the observation of the trend in fluorescence (from

background levels to peak concentration and back to background levels) as the dye passes the sampling points.

Report on Findings and Interpretation. The report will include a narrative description of the tracer study implementation. The interpretation of the results with a time of travel determination shall be documented in the report.

8.0 Scope of Work - Phase I Tasks (POH Funded Actions):

Task 1: Project Work plan for Preparation, Project Management, and Closeout.

POH will oversee the development of the Study work plan including the project management plan, review the workplans provided by the researcher/contractor and provide assistance to DOH in review of the Phase II workplan to ensure consistency and integration of the activities. POH will provide overall project management support for Phase I and Phase II tasks, will coordinate reviews between EPA, DOH and the researcher/contractor (assisting DOH with coordination as needed for DOH contractor) and will oversee the compilation of the Phase I and Phase II tasks into the final and complete study document. POH will also be responsible for all technical and financial closeout activities associated with the study.

Task 2: Review of Literature, Research Publications and Studies.

Prior to the initial field survey, review the following types of resources, as available, pertaining to the geologic and hydrologic features from the facility to the marine waters in the study area between Black Rock and Honokowai Point.

- Aerial or satellite photographs/images
- Topographic maps
- Geologic/hydrologic documents
- Well logs
- Previous reports and research about the site

The Researcher/Contractor shall review and consider the past tracer study conducted in 1993 (titled Effluent Fate Study Lahaina Wastewater Reclamation Facility, Maui, Hawaii, dated February 1994), UH and USGS published studies as cited in the background section above, and other applicable background sources (e.g., UIC permit renewal application available at http://www.epa.gov/region9/water/groundwater/uic-pdfs/LahainaPermitApp.pdf). In particular, the geology and hydrology of the area shall be considered in the design of the study.

Task 3: Field Reconnaissance.

The Researcher/Contractor shall conduct field reconnaissance to support designing the study. The initial design work will consist of determining the best dye-release practices, the sampling locations, and the sampling strategy to have a successful test. To support these efforts, a field survey must include locating the specified submarine seeps in the near shore marine waters,

determining other sampling locations, and recording physical characteristics of both the injected effluent and ground water. The Researcher/Contractor shall tour the LWRF to become familiar with the operation, maintenance, and performance of the injection wells to consider for the dye-release procedures.

The field reconnaissance will also involve investigation of specified submarine seeps and any other locations in the near shore marine waters, which may be potential emergence points. A portion of the field work should be completed under conditions of moderate to high injection well flow and low tide so the dominant emergence points are active. The Researcher/Contractor shall measure and record physical characteristics of monitoring locations, such as the Global Positioning System (GPS) coordinates, a measurement or estimate of the discharge volume, measurement of the discharge temperature, specific conductance, salinity, and pH. For conducting a quantitative tracer test (see the interpretation task below), the Researcher/Contractor will need to measure or reasonably estimate discharge at each sampling station.

Four known submarine seeps, in particular, are important to include as sampling locations because they were confirmed by the UH and USGS studies as having wastewater effluent signatures from the facility. The Researcher/Contractor shall include the four submarine groundwater seeps in the vicinity of Kahekili Beach Park at the following locations: Seep 1 - Latitude 20°56'23"N (N20 56.391), Longitude 156°41'34"W (W156 41.581); Seep 2 - Latitude 20°56'19"N (N20 56.318), Longitude 156°41'35"W (W156 41.591); Seep 3 – Latitude 20°56'23.6"N, Longitude 156°41'34.5"W; and , Seep 4 - Latitude 20°56'18.7"N, Longitude 156°41'35.1"W. (See Figure 2) These seeps are approximately 2600 to 3400 feet from the facility injection wells.

Interviews with various local experts (i.e., Department of Land and Natural Resources, Division of Aquatic Resources [DLNR-DAR], other UH or USGS researchers that have studied the area) and Maui County representatives may also be useful for review of injected effluent characteristics, local hydrology and geology, coastal water submarine spring or seep locations, and possible flow path(s) of the effluent plume.

Task 4: Tracer Study Design.

The Researcher/Contractor shall consider the expense and time to conduct the work and use their best professional judgment to accomplish the work to ensure the tracer study design will satisfy the purpose of the study. The Researcher/Contractor may consult with POH, DOH and EPA by conference call to discuss the approach for any of the design subtasks. Any clarifications may be provided by technical direction letter.

Subtask 4.1: Tracer Selection and Amount.

This step includes selecting the type and amount of tracer, defining relevant tracer properties to meet the study goals and evaluating interference from the chemistry of the effluent characteristics. This step will also include evaluation of the tracer properties to ensure a

successful test under expected release and sampling conditions. The Researcher/Contractor shall consider modeling tools to determine the amount of tracer needed for injection, predict tracer-breakthrough characteristics, and the time intervals needed for effective sampling of the passage of the tracer.

Several fluorescent dye types may be considered for the tracing test. Table 1 lists the most commonly used dyes and their relevant properties; additional information may be found in Flury and Wai (2003) and Käß (1998, p. 18–122). Several of the dyes listed in Table 1 are preferred over the others (e.g, Acid Yellow 73 is the most preferred dye) for a variety of reasons (e.g., cost, fluorescence, ease of use, etc.). In terms of safety of their use in a public recreational area, many of the fluorescent dyes listed in Table 1 have been used for many years (e.g., Acid Yellow 73 has been used for >100 years) and with no significant reported adverse effects (Field et al., 1995; Behrens et al., 2001; Field, 2005).

Table 1. Typical fluorescent dyes used for hydrologic-tracing studies and their basic properties; after (Leibundgut et al., 2009, p. 67) and (Käß, 1998, p 18–122).

Fluorescent Dye Identification Name/Number				Fluorescent Dye Properties					
C.I. Generic Name	Common Name	C.I. Constitution Number	CAS Number	Excitation Maximum (nm)	Emission Maximum (nm)	Fluorescence Intensity (%)	Detection Limit (µg L⁻¹)	Photochemical Decay Rate	Temperature Exponent Γ (C°)
Acid Blue 9	Erioglaucine	42090	3844-45-9	?	?	?	?	?	?
Acid Red 50	Acid Rhodamine G Sulpho Rhodamine G	45220	5873-16-5	535	555	14	?	1.5	0.0035
Acid Red 52	Acid Rhodamine B Sulpho Rhodamine B	45100	3520-42-1	560	584 590 (Liquid)	30	0.03	1.3	0.028
Acid Red 87	eosin, eosine	45380	17372-87-1	515	535	18	0.01	182	-0.00036
Acid Red 92	Phloxine B	45410	18472-87-2	541	559	?	?	?	?
Acid Red 388	Rhodamine WT	...	37299-86-8	558	583	25a	0.02	0.84	0.027
Acid Yellow 7	Lissamine Flavine FF	...	2391-30-2	422	512	1.6	?	0.91	0.003
Acid Yellow 73	sodium fluorescein uranine	45350	518-47-8	491b (492) 438c	512b (513) 512c	100b 20c	0.001	100	0.0039
Basic Violet 10	Rhodamine B	45170	81-88-9	555	582	60	0.02	1.4	0.025
Direct Yellow 96	Diphenyl Brilliant Flavine 7GFF	...	61725-08-4	415	489	?	?	?	?
Solvent Green 7	pyranine	59040	6358-69-6	460 407	512b 445c (512)	18b 8c	0.06	24	0.0019
...	amino G acid	...	86-65-7	359	459	1.0	?	15	?
...	sodium napthionate	...	130-13-2	325	420	18	0.2	27	?

a Calculated for dry mass.
b At pH = 9.5.
c At pH < 2.5.
d As a liquid.
e Accession number.

Subtask 4.2: Dye Release Procedures.

The Researcher/Contractor shall determine the best dye release procedures for a successful test. This aspect of designing the test should consider if one or more of the injection wells should have a dye release with the rationale provided in the proposal for the test design. Because injection well #2 has the greatest capacity of the wells, the Researcher/Contractor, at a minimum, shall plan dye injection to this particular well. The Researcher/Contractor may also consider using different tracers for different wells.

Dye release procedures should establish the dye release rate and/or a slug release procedure, and duration characteristics to best represent the flow path and travel rate of the injected effluent. Potable water may be used to flush the dye past the injection well formation so that less dye will be absorbed by the formation. The Researcher/Contractor may consider the impact on the results of the dye test and the expense and time to conduct the test.

Subtask 4.3: Tracer Study Area.

To ensure dye emergence locations will not be missed during the investigation, this step of the study will rely on the desktop review and field survey to define and map the study area. Boundaries of the study area will also be defined by available hydrologic data and hypothesized groundwater flow from injection wells site to coastal water.

Subtask 4.4: Monitoring Strategy

The use of modeling tools to predict tracer-breakthrough characteristics and time intervals needed for effective sampling of the passage of the tracer should be considered. The Researcher/Contractor shall determine the sampling strategy and methods to monitor for background fluorescence and emergence of the dye tracer. The Researcher/Contractor shall also determine a timing schedule for tracer monitoring. Timing for detecting the first positive confirmation of tracer through the last detection will be critical to the usefulness of the results. The Researcher/Contractor shall have a standard protocol to determine what constitutes background, positive, and negative (non-detect) results.

Numerous samples will be collected from within the dye cloud as it emerges from submarine seeps into the marine waters. The Researcher/Contractor will need to describe in the study work plan how quickly samples will be analyzed and how samples will be stored prior to analysis. The recreational use of the coastal area, surf, and weather conditions should be considered in developing the sampling strategy. For instance, in areas accessible to the public, it may be necessary to consider monitoring procedures which include redundant, backup sampling devices for each sampling location in the event that the primary device is damaged, lost or stolen.

The monitoring plan should describe how the submarine seeps will be sampled to insure that groundwater is captured by the sampling apparatus. It is also recommended that salinity, silica content, or other parameters be used to confirm that samples from springs or seeps contain groundwater.

Subtask 4.5: Tracer Study Design Proposal.

Prior to the preparation of a written plan for the tracer study, collected and evaluated data will be used to propose the design plan. The Researcher/Contractor shall submit a brief written proposal outlining the proposed tracer study design, including, but not limited to, the amount and type of tracer needed for injection, dye release procedures, predicting tracer-breakthrough characteristics, sampling methods, and the time intervals needed for effective sampling of the passage of the tracer. This proposal shall be subject to changes through discussion with POH,

DOH and EPA by conference call and written comments from POH, DOH and EPA. Upon approval of the proposal, the Researcher/Contractor shall write a detailed work plan for the study as described in Task 5.

Task 5: Tracer Study Work Plan.

The written work plan shall explicitly describe how the test will be conducted, how much of which tracer(s) will be used, where injected, where sampled, for how long, etc. The Researcher/Contractor
shall also include a monitoring plan for background and tracer detection. Attachments to the work plan must include a sampling and analysis plan, Quality Assurance/Quality Control procedures (for field and laboratory), and a proposed tracer study schedule. The proposed schedule may change based on unpredictable weather or unanticipated events. The work plan shall identify the researchers and any other persons, who are expected to assist in conducting the study.

Task 6: Background Assessment.

The Background Monitoring task involves the monitoring of specified submarine seeps and other potential emergence points in the study area for background concentrations of fluorescence and/or other chosen tracer type, if applicable, from man-made substances and natural interference. From the effluent characteristics, some of the background substances will be predictable (e.g., the fluorescence presence of optical brighteners in municipal wastewater) and must be considered in early design planning. The results of the background concentrations will need to be considered in the quantitative interpretation of the results. The Researcher/Contractor shall report the sampling locations and background concentrations. Field and laboratory QA/QC data and results shall be provided in this report for use in Phase II of the study implementation.

Since background fluorescence can be variable, it is important to know the background fluorescence the week prior to dye injection and determine its variability over a period of approximately two weeks prior to dye injection.

9.0 <u>Scope of Work - Phase II Tasks (DOH Funded Actions for Work In-Kind Match):</u>

Task 7: Tracer Study Implementation.

Subtask 7.1: Dye Release Notification

The Contractor shall notify EPA and DOH of the actual date of dye injection at least one week prior to the start of the activity. This notification shall be by email correspondence to the appropriate EPA and DOH contacts. The Contractor will need to coordinate the activity and arrange site access with Maui County Department of Environmental Management. Maui County will need adequate lead time to consider notification of any other local agencies and the local community in the immediate area of the pending fluorescent-dye release.

Subtask 7.2: Dye Injection and Monitoring.

This is actual implementation of the test design, including the required documentation (field notes, etc.). Unanticipated field conditions may make it necessary to modify the work plan. If any such changes become necessary, the Contractor shall notify DOH, send a proposed amendment, and obtain prior approval for any changes. An email correspondence to the DOH and EPA contacts will be acceptable to propose amendments and receive approval. All monitoring locations shall be prepared according to the work plan, or approved changes.

The Contractor shall implement dye release procedures as described in the approved work plan. Monitoring, sampling and analysis will be implemented as described in the approved work plan. Any unexpected occurrences will need to be noted and reported in the final report. The Contractor shall maintain and document the integrity of samples collected to produce data of legally defensible quality.

The DOH and EPA contacts shall be notified of schedule changes, at least 72 hours prior to the change. Prior consideration should have been given to adapt sampling methods to the recreational use of the public coastal area and to potential weather conditions, as described in the design task above.

Task 8: Test Interpretation.

Upon completion of the study, the Contractor shall provide analysis and interpretation of the results. The Contractor shall conduct a quantitative interpretation and consider additional analysis of results, if appropriate.

For quantitative interpretation, the observations are recorded on a plot of the fluorescence or dye concentration levels over time, called a breakthrough curve (see Figure). Where sufficient data exists, the Contractor shall provide a breakthrough curve. The breakthrough curve will show observation of the increase and decrease in fluorescence at the sampling location, which will improve confidence that the samples reflect passage of the injected tracer rather than fluctuations in background fluorescence.

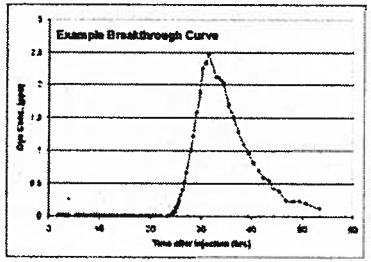

Figure: Example breakthrough curve for an injected dye tracer.

All tracer tests that result in a defined BTC coupled with discharge measurements should include a solute-transport modeling to "calibrate" the tracer-test results with a theoretical model. This is often necessary because long BTC-tails tend to severely skew travel time and dispersion estimates.

Breakthrough curve analysis will be used to determine the mean time of travel of the injected tracer. The Contractor shall calculate the average groundwater velocity based on the mean time of travel.

Task 9: Report on Field Work, Results, and Interpretation.

In this final report, the Contractor shall document the interpretation of the results with supporting analysis of the data. The Contractor shall also provide a narrative description of the tracer study implementation, any unexpected occurrences during the study, and an explanation of how any of these occurrences may have affected the results.

Data for all sites sampled and results with documentation of QA/QC samples shall be included in the report. Results shall highlight where positive tracer detections were found with a summary of first, peak, and last detection time. The Contractor shall provide a time of travel and groundwater velocity determination, a description of the variation in time of travel, and a map showing the spatial positions of all positive detections.

10.0 Points of Contact:

POH Contact:

Ms. Cindy S. Barger
Watershed Program Manager
US Army Corps of Engineers, Honolulu District
Civil and Public Works Branch (CEPOH-PP-C)
Bldg 230
Ft. Shafter, HI 96858
e-mail: cindy.s.barger@usace.army.mil
Phone: (808) 438-6940

DOH Contact:

Mr. Daniel Chang
Safe Drinking Water Branch
State of Hawaii Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801
e-mail: daniel.chang@doh.hawaii.gov
(808) 586-4258

Location of Facility:

Lahaina Wastewater Reclamation Facility
3300 Honoapiilani Highway

Honokowai, Lahaina, Maui, Hawaii 96761-9413

County of Maui Contacts:

Dave Taylor, Wastewater Reclamation Division Chief
Phone: (808) 270-7421
e-mail: David.Taylor@co.maui.hi.us

Cheryl K. Okuma, Esq., Director
Phone: (808) 270-8230
e-mail: Cheryl.Okuma@co.maui.hi.us

County of Maui, Department of Environmental Management
2200 Main Street, Suite 100
Wailuku, Maui, Hawaii 96793

EPA Contacts:

United States Environmental Protection Agency, Region 9
Ground Water Office, WTR-9
75 Hawthorne Street
San Francisco, CA 94105

Nancy Rumrill, Environmental Engineer
Phone: (415) 972-3293
e-mail: Rumrill.Nancy@epa.gov

David Albright, Manager
Phone: (415) 972-3971
e-mail: Albright.David@epa.gov

11.0 Budget Estimate:

TASK	ESTIMATED COST	POH FUNDED	DOH WORK IN-KIND
Project Management	**$21,500**	$14,000	$7,500
Finance/Accounting	**$5,000**	$5,000	—
USACE P2 Scheduling/Reporting	**$2,500**	$2,500	--
Inter-Island Travel	**$1000**	$500	$500
Phase I Tasks	**$125,000**	125,000	--
CESU Researcher	$101,750	$101,750	--
CESU Researcher DOH (17%)	$17,298	$17,298	--

ERDC Contract Oversight (5% of total CESU)	$5,952	$5,952	--
Phase II Tasks	**$140,000**	--	$140,000
Report Compilation	**$2,000**	$2,000	--
QC Review	**$3,000**	$1,000	$2,000
TOTAL	**$300,000**	$150,000	$150,000

Enclosure 1 – EPA Approval for DOH Use of Funds as In-Kind Match

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

August 10, 2010

Daniel Chang
State of Hawaii, Department of Health
PO Box 3378
Honolulu, HI 96801-3378

Subject: Clean Water Act 106 funds to support the US Army Corps of Engineers' Lahaina Wastewater Reclamation Facility Tracer Study

Dear Dan,

Per the Hawaii Department of Health's (DOH) request, EPA has researched and concluded that it is appropriate and allowable for DOH to designate Clean Water Act (CWA) Section 106 funds to leverage the US Army Corps of Engineers' (USACE) Lahaina Wastewater Reclamation Facility Tracer Study. We understand this will be a partnership between the USACE and DOH with EPA providing technical assistance. EPA's legal counsel has advised that DOH may choose to enter into a partnership agreement with the USACE and designate CWA 106 funded projects as cost-share to the USACE project. The Water Resources Development Act (2007) allows the USACE to recognize DOH CWA 106 federal funds supporting portions of the tracer study effort to count as 'in-kind' services toward the non-federal share of the USACE study.

Hawaii's CWA 106 grant funds may only be used as match to support work consistent with CWA Section 106 Guidelines. EPA has determined that the tracer study falls within these guidelines.

If you have any questions, please give me a call at 415-972-3963.

Sincerely,

John Ungvarsky
Hawaii CWA 106 Grant Project Officer
Water Division

cc: Cindy Barger, Biologist/Project Manager, USACE. Honolulu District